REMARKS

Applicant respectfully requests reconsideration and allowance of the subject application in view of the amendments and the remarks to follow. Claim 7 has been amended and new claims 23-27 have been added. Claims 1-27 are pending in this application.

The amendments to the specification merely update related application data and/or correct minor informalities noted during review. No new matter is added by the amendments to the specification.

The amendment to the drawing addresses minor informalities noted during review and/or brings the drawing and specification into mutual conformance. No new matter is added by the amendment to the drawing. The Examiner's approval of the amendment to the drawing is requested. Formal drawing is enclosed herewith.

The amendment to claim 7 merely places claim 7 in independent form and is not intended to alter the scope of the claims. No new matter is added by the amendment to claim 7.

New claims 23-27 are supported at least by text appearing at p. 4, line 15 through p. 22, line 15 of the application as originally filed. No new matter is added by new claims 23-27. New claims 23-27 are similar to claim 20 et seq. but differ in scope. New claims 23-27 distinguish over the art of record and are allowable.

35 U.S.C. § 103

Claims 1-17 and 19-22 stand rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,580,430 to Hollis et al. (hereinafter "Hollis"). Claim 18 stands rejected under 35 U.S.C. §103(a) as being unpatentable over Hollis in view of Published U.S. Patent Application No. 2001/0030648 to Deering (hereinafter "Deering"). Claims 20-22 stand rejected under 35 U.S.C. §103(a) as being unpatentable over Hollis in view of U.S. Patent No. 6,545,685 to Dorbie (hercinafter "Dorbie"). Applicant respectfully disagrees and requests reconsideration. In traversing the rejection, it is helpful to first review the teachings of the reference(s).

Hollis is directed (see, e.g., Title) to a "Method and apparatus for providing improved fog effects in a graphics system". Hollis teaches (Abstract) "A graphics system including a custom graphics and audio processor produces exciting 2D and 3D graphics and surround sound. The system includes a graphics and audio processor including a 3D graphics pipeline and an audio digital signal processor. Improved fog simulation is provided by enabling backwards exponential and backwards exponential squared fog density functions to be used in the fog calculation. Improved exponential and exponential squared fog density functions are also provided which provide the ability to program a fog start value. A range adjustment function is used to adjust fog based on the X position of the pixels being rendered, **thereby preventing range error as the line of sight moves away from the Z axis**. An exemplary Fog Calculation Unit, as well as exemplary fog control functions and fog related registers, are also disclosed."

Hollis employs a label "alpha" to represent angular deviation from the Z axis, stating (col. 10, line 59 et seq.; see Fig. 7) that "The eye-space z used for fog calculations, in the manner described above, does not represent the correct range unless the viewer is facing the same direction as the Z axis. Specifically, as shown in FIG. 7, if only the eye-space z is used for determining the range, and increasing error will result as the line of sight moves away from the Z axis. As shown in FIG. 7, the range error, represented by shaded portions 610a and 610b, increases as the angle .**alpha**. increases away from the Z axis. However, in accordance with a preferred embodiment of the instant invention, **a range adjustment factor based upon the x value is used to compensate for this inaccuracy**. The range adjustment or fog compensation function effectively increases the fog density towards the edges of the screen in order to make the fog effect more accurate and realistic."

In contrast, Applicant calculates an effective attenuation factor, also, but coincidentally, designated by the word "alpha". See, for example, at least text appearing at p. 4, line 15 et seq. ("Travel distance information is then obtained in an alpha channel."), text appearing at p. 14, line 15 et seq. ("In step 430, travel distance information in the alpha channel is then converted to a fog factor (also called an attenuation factor)."), Figs. 4, 5A, 5B, 6 and 7B through 7E and supporting text, e.g., page 14, line 1 et seq.; and Eqs. 1 through 7.

Applicant does this by first deriving volume object data representative of fog regions (see step 410, page 13, line 13 et seq.), determining travel distance information (see step 420, page 14, line 1 e seq.), obtaining total travel distance information in a alpha channel (see page 14 line 11 et seq.), converting such to a

fog factor (see step 430, page 14, line 15 et seq.) and then blending such with color information (see step 440, page 14, line 16 et seq.).

The Office Action correctly states (p. 2) that "Hollis does not explicitly disclose storing this information in an alpha channel." and then incorrectly states that "At the time the invention was made, it would have been obvious to a person of ordinary skill in the art to store fog boundary information in an alpha channel. One of ordinary skill in the art would have been motivated to do so because regardless of the name being applied ("alpha channel" in this case), it is just a device being used to store graphics data." It does not make sense to interchange angular data, as taught by Hollis vis-à-vis "alpha", with distance or scaled distance information vis-à-vis Applicant's "alpha channel".

Claim 1 recites "A method comprising: determining a distance between a user to boundaries of a gaseous volume; and storing the distance in an alpha channel to arrive at an alpha value", which is not taught, disclosed, suggested or motivated by Hollis.

Claim 8 recites "A system for displaying a volumetric gaseous phenomenon in a scene, comprising: an alpha channel, configured to receive travel distance information about the gaseous phenomenon; a fog unit, configured to receive the travel distance information from the alpha channel and covert the information to a fog factor value; and a blending unit, configured to blend a color of the gaseous phenomenon with a color from the scene based on the fog factor value to produce a pixel", which is not taught, disclosed, suggested or motivated by Hollis.

Claim 14 recites "A method for rendering volumetric fog or other gaseous phenomena, comprising: receiving volume object data that defines at least one

three-dimensional bounded volume region; and obtaining travel distance information in an alpha channel, the travel distance information being a function of distances in each three-dimensional bounded volume region having a face between a respective pixel and a reference point", which is not taught, disclosed, suggested or motivated by Hollis.

Claim 19 recites "A system for rendering volumetric fog or other gaseous phenomena, comprising: means for receiving volume object data that defines at least one three-dimensional bounded volume region; and means for obtaining travel distance information in an alpha channel, the travel distance information being a function of distances in each three-dimensional bounded volume region having a front face between a respective pixel and a reference point", which is not taught, disclosed, suggested or motivated by Hollis.

The Office Action states (p. 2) that "Referring to claim 1, Hollis discloses a method comprising determining a distance between a user to boundaries of a gaseous volume (col. 10, lines 4-5) and storing alpha information (col. 9, line 30)." Applicant respectfully notes that Hollis does not teach storing alpha information in the latter-cited passage.

Col. 9, lines 27-36 states that: "Texture unit 500 outputs filtered texture values to the texture environment unit 600 for texture environment processing (600a). Texture environment unit 600 blends polygon and texture color/alpha/depth, and can also perform texture fog processing (600b) to achieve inverse range based fog effects. Texture environment unit 600 can provide multiple stages to perform a variety of other interesting environment-related

functions based for example on color/alpha modulation, embossing, detail texturing, texture swapping, clamping, and depth blending."

As noted above, Hollis does not teach use of an attenuation channel or storage of such information. As a result, Hollis fails to provide the elements recited in any of claims 1, 8, 14 or 19 or claims dependent therefrom. For at least these reasons, the rejection of claim 1, 8, 14 or 19 and claims dependent therefrom is prima facie defective and should be withdrawn, and claims 1, 8, 14 or 19 and claims dependent therefrom should be allowed.

Deering is directed (see, e.g., Title) to a "Graphics system configured to implement fogging **based on radial distances**" (emphasis added). Deering teaches (Abstract) that: "A graphics system configured to implement fogging according to **an improved method based on radial distances**. The amount of fog applied varies **based on a spherical or radial distance from an object to a viewpoint**. In another embodiment, **the amount of fogging applied may depend on the cylindrical distance form** [sic] **an object to a viewpoint**. Fogging cylinders or spheres may be used to define fogging regions where the amount of fogging is applied according to different mathematical functions."

In contrast, claim 18 recites that "the travel distance information comprises scaled total travel distance information, the scaled total travel distance information being equal to the sum of distances through each three-dimensional bounded volume region along a ray between a respective pixel and a reference point scaled by a scaling value", which is not taught, disclosed, suggested or motivated by Hollis and/or Deering, alone or in any proper combination.

Hollis and Deering are both concerned with angular deviations or coordinates and neither is concerned with use of travel distance information to derive an effective attenuation factor or scaled total travel distance information, as recited in claim 18. As such, the proposed combination fails to provide the subject matter of claim 18 and in fact is inapposite thereto. For at least these reasons, the rejection of claim 18 is prima facie defective and should be withdrawn, and claim 18 should be allowed.

Dorbie is directed (see, e.g., Title) to a "Method and system for efficient edge blending in high fidelity multichannel computer graphics displays". Dorbie teaches (Abstract): "A method for implementing edge blending between a first and second video frame to create a seamless multichannel display system. The method is implemented in a graphics computer system including a processor coupled to a memory via a bus. Within the computer system, a first video frame is rendered for display on a first video channel. A second video frame is rendered for display on a second channel. A first overlap region is rendered onto the first frame to obtain a first blended video frame. A second overlap region is blended onto the second frame to obtain a second blended video frame. The first blended video frame from the first channel and the second blended video frame from the second channel are then combined such that the first overlap region and the second overlap region correspond, thereby forming a seamless junction between the first blended frame and the second blended frame and implementing a high fidelity multichannel display."

In contrast, claim 20 recites "A system for rendering volumetric fog or other gaseous phenomena, comprising: volume object data that defines at least one

three-dimensional bounded volume region; a one-dimensional texture stored in texture memory; a graphics subsystem that obtains travel distance information in an alpha channel, the travel distance information being a function of distances in each three-dimensional bounded volume region having a front face between a respective pixel and a reference point; and an alpha buffer that stores the obtained travel distance information in an alpha channel for each pixel that covers one or more of the three-dimensional bounded volume regions", which is not taught, disclosed, suggested or motivated by Hollis and/or Dorbie, alone or in any proper combination.

As noted above, Hollis is inapposite to the subject matter of Applicant's claims. Dorbie fails to cure these deficiencies. As a result, the rejection of claim 20, and thus of claims 21 and 22, is prima facie defective and accordingly should be withdrawn, and claims 20-22 should be allowed.

Further, with respect to all of the rejections, the Office Action fails to establish a prima facie case of obviousness. Applicant notes that criteria for such are set forth in MPEP §2143, entitled "Basic Requirements of a Prima Facie Case of Obviousness" (see also MPEP §706.02(j)).

This MPEP section states that "To establish a prima facie case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings." No appropriate motivation or guidance has been identified in the references by the Office Action to modify or combine the reference disclosures.

This MPEP section also states that "Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations." As noted above, the references fail to teach or suggest all of the recitations of any of the Applicant's independent claims. As such, there can be no reasonable expectation of success.

This MPEP section further states that "The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991)." This requirement is also described in MPEP §2143.01, entitled "Suggestion or Motivation To Modify the References." This MPEP portion includes a subsection stating that "THE PRIOR ART MUST SUGGEST THE DESIRABILITY OF THE CLAIMED INVENTION".

Inasmuch as the prior art references are silent with respect to the problem to be solved, it is inconceivable that combining the teachings of the references could suggest the desirability of the claimed subject matter. As a result, the rejection fails all prongs of the test set forth in the MPEP for a prima facie finding of unpatentability.

Moreover, with respect to all of the unpatentability rejections, no evidence has been provided as to why it would be obvious to modify the teachings of the reference(s). Evidence of a suggestion to combine or modify may flow (i) from the prior art reference itself, (ii) from the knowledge of one skilled in the art or (iii) from the nature of the problem to be solved. However, this range of sources docs not diminish the requirement for actual evidence. Further, the showing must be clear and particular. See *In re Dembiczak*, 175 F.3d 994, 998 (Fed. Cir. 1999).

Conclusion

Claims 1-27 are in condition for allowance. Applicant respectfully requests reconsideration and issuance of the subject application. Should any matter in this case remain unresolved, the undersigned attorney respectfully requests a telephone conference with the Examiner to resolve any such outstanding matter.

Respectfully Submitted,

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